Methods of programming of housing construction in Czechoslovakia

Josef Kroupa

TERPLAN
Czechoslovakia

I. Introduction - Explanation of terms

1. The appraising of a country's housing problems will emerge from the answers to four questions :

   i / the present housing stock / in its quantity and structure/ does correspond or not to the demands of the present population ?

   ii/ how many people must be housed during a certain period ?

   iii/ how many separate households will they form and how many houses and of what structure will these households require - need ?

   iv/ what quantity of the existing housing stock has to be demolished successively and replaced by newly built houses ?

2. The programming of the house building involves following aspects :

   i / quantitative
   ii/ qualitative — in time — in space

3. The programming of the house building is based on the principles of :

   i / ascertainment, analysis and forecast of future subjective demands

   ii/ ascertainment, analysis and calculation of future objective needs

   iii/ combination of the mentioned approaches

   Which of these principles is being asserted when preparing the programmes of house building depends on :
   i / social-economic system of a country
   ii/ existing housing situation

4. Principles of individual approaches to the programming of the house building :

   i / base of subjective demands :
   the activity of the state is restricted to the formation of suitable common conditions for the building of houses and to the preservation of real market relations. The volume of the building is determined to largest extent by the market situation, the house building forming a sort of

other " usual " demands.

ii/ base of objective needs :
programming of the house building is regarded as an integral part of the whole economy.
The scale of the house building is not determined by the subjective desires and possibilities. It forms an integral part of an active social policy and , therefore , it expresses the extent of objective needs. This objective need expresses the quantity of the flats / houses / to be needed for the fulfilment of certain social policy.

5. Terms:

i / quantitative need means the quantity of dwellings needed for the achievement of a normatively fixed balance [x1/] between the number of dwellings and that of households.

ii/ qualitative need means the number of dwellings to be built in order to supplement the housing stock in such a way that the structure of housing stock as for the size and sort should correspond to the criterias of the social policy [x1/].

There is no sharp difference between the quantitative and qualitative need. It is because that when satisfying the quantitative needs a part of qualitative needs is being satisfied too. The standards of the newly built dwellings are higher than that of the old ones.

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x1/
the normatively fixed balance, the criteria of social policy, are dynamic in their mathre. It can be said: " the more determined a nation is to resolve its problems, the faster will be the tempo of social change and the sooner new aspirations take the place of the old "

- D.V. Donnison : The Government of Housing / p. 19./

II. Scheme of the balance of objective need of the house building

A. Present housing needs

B. Compensation of demolished housing stock

C. Dwellings needed for new households

A-I.- Present housing needs - Principles of the calculation

1. The present housing needs / present housing shortage / are assessed, in accordance with selected criteria of standard of living, on the basis of statistical data at the time of the census.

2. The present housing needs are measured by the number dwelling units and not by the number of rooms or any other units / as in some other countries /

3. The present housing needs are expressed by :

   i / the number of dwellings required to ensure the independent housing for such households as live unwillingly in shared dwellings

   ii/ the number of dwellings required to reduce the density of population/ the overcrowding / in unshared dwellings

   iii/ the number of dwellings required for independent households living in unsatisfactory dwellings.

   Items Nos. i/ and ii/ are decisive, item No. iii/ partly coinciding with the former two items.

4. Explanation of terms :

i / base of the census :
the results of the census have been processed on the basis of all resident population and not on so - called enumerated population[x2/].
The proper list of dwellings was based on the set of persons living in flats in fact. I has been accepted the principle that the inhabitants of flats have to be calculated in all flats which they occupy.
The stipulation of the volume of the present housing needs is based on the enumeration of the number of permanently occupied flats only. Occasionaly occupied flats are not taken into balance.

ii/ dwelling house[x3/] is such a one the whole floor area of which is at least of two third destined for the dwelling purposes.
When examining the ratio of exploitation of the floor area there have not to be taken into consideration such spaces which are open to all tenants and to other persons / staircase, corridors, common was-rooms, drying-kiln, attic and cellar rooms/, then also such ones which are destined to agricultural and other nonhabitable purposes.

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x2/ There is the difference between the "resident "and the "present "population.
The term "resident population" covers the following items :
a/ resident population just present
b/ resident population just absent:
- for the reasons of study and of apprenticeship
- for the reasons of employment
- for other reasons

x3/ Law on Flat Management No 41/1964

iii/ family house :

the definition of the family house is the same as that of the dwelling house, the following restrictions, however, are taken for adequacy :

a/ the number of dwellings is restricted to the five habitable rooms, kitchens not included

b/ greater number of dwellings is admissible when their total living area does not surpass the limit of 120 sq. m. When calculating the total living area the parts of floor area of kitchens surpassing 12 sq. m. have to be taken into account.

The habitable parts of landed properties have to be judged according to the same criteria.

iv/ definition of a dwelling :

a dwelling is a room or a number of habitable rooms and the respective amenities serving for living and forming, from the technical, structural point of view, one integral whole under one lock and key, provided with one exit leading to a common corridor, staircase, street, yard or some other space of common use. Separate rooms in the house which are used by the user of dwelling are considered part of the said dwelling.

v / definition of a habitable room :

all rooms / with the exception of kitchen / which have direct daylight illumination and can be directly ventilated, and directly or indirectly sufficient heated, are intended for living purposes by their interior arrangement and have a floor area at least 8 sq. m. shall be registered as habitable rooms with a floor area 8 sq.m. and more. In a separate column, rooms shall be registered as having a floor area smaller than 8 sq.m. but in excess of 4 sq.m. Under the heading of "kitchen" such rooms shall be registered as are meant for the kitchen in the drawings intended for construction, regardless of the manner of use by the user of the dwelling or such a room as has been changed into a kitchen by some constructional changes and whose floor area is larger than 4 sq.m.

footnote: a comparison of the definition applied in the census of 1950 and that of 1961 reveals that the census of 1961 did not consider the so-called "certified flat" / i.e. a group of rooms alloted to some user within one technical dwelling unit by means of a certificate/, but only flats representing complete technical units regardless of the fact whether they were inhabited by one or more households to whom separate certificates were issued. In comparison with 1950, the number of rooms was reduced, as since 1961, in accordance with the Law on Flat Management only a room with a floor area in excess of 8 sq.m. has been considered as a habible room. This change is reflected also in the definition of the living area, the total living area of a dwelling including only the floor area of rooms with 8 sq.m. or more of floor area and only that part of the floor area of the kitchen as exceeds 12 sq.m.
In flats consisting only of a kitchen- cum - living room the whole floor area of the kitchen is included in the living area.

vi/ definition of a household :

in the census of 1961 a household was defined as the so-called "census household". This meant that in the course of processing the data of the census the households were constructed in accordance with an objectively ascertainable family and the social relations of persons living together in one dwelling. All persons living together in one dwelling were divided into two or more types of census households. In all there were four types of census households :

A. Family households the core of which consisted of

i / a married couple
ii/ one parent with at least one child

B. Other households consisting of

i / two or more single persons
ii/ one single person

The individual household types were characterized by the following requirements :

Ai/ the household must include a married couple / in legal or actual meaning / whether with or without children. It may also include other persons, whether related or unrelated to the couple, non of whom, however, may live there with her husband / his wife /, or child as they would thus form another family of the Ai/ or Aii/ types.

Aii/ the household must include one of the parents / widower, divorced or unmarried mother or father/ with whom at least one child must live. It may include also other single persons under the same stipulation as quoted in Ai/.

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footnote : the census carried out in 1950 bas based on the so-called declaratory household, which was a group of people living in one flat which declared that they live together as one household. Such declaration is uncontrollable and the results based on this principle are unreliable.

Bi / the households must include single persons unrelated by marriage / which would be the household of the type Ai/. A child may not live with any of them / household of the Aii type /. Should they be related, their relation may be of indirect lineage, it may consist only of the third or futher generation descendents.

Bii/ only single persons living alone. Lodgers were considered as separate census households.

5. Comments:

When assessing quantitative housing needs it is very importatn, yet at the same time very difficult, to determine how many households living together in one dwelling are really in need of separate dwellings. They are two ways of assessing the number households which should be allotted independent dwellings. The first, so-called subjective method, is based on the wish to get separate dwelling, while the other, so-called objective method, determines the number of households which should not go on living together on the basis of objective data on the density of population in dwellings, quota of floor area for person, or other objective characteristics, such as the type of building, type of dwelling, tenure, etc.
Each of these methods has its advantageous and disadvantageous. In the Czechoslovak praxis the objective method is being used mostly for the stipulation of present and long-term needs while the subjective method for the stipulation of the short-term needs.

A-II. Calculation of present needs

A - Method of living standard[x4/]

1. All dwellings have been classified into three large groups :

   i / overcrowded dwellings[x5/]
   ii/ adequately populated dwellings
   iii/ underoccupied dwellings

   The margins of the individual groups of dwellings were stipulated separately for the dwellings inhabited by one census household and for the dwellings inhabited by two and more census households, as shown in the following table.

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x4/ this method has been elaborated by Jiri Musil - Research Institute for Building and Architecture-Prague.

x5/ this classification is derived from the Law on Flat Management which takes 12 sq.m. for the upper limit of adequacy. The lower limit - 8 sq.m. - is also derived from the above mentioned law which takes for habitable room which has a floor area 8 sq.m. and more. Even when these criteria are derived from the law, nevertheless they represent the criteria agreed with the state planning centre.
Further method, analysed in the next chapter, involves a little different criteria differentiated according to the number of members of a household.

Criteria of overcrowding, adequate occupation and underoccupation of dwellings

number and type of census households	overcrowded dwellings	adequately occupied dwellings	underoccupied dwellings
dwelling households[x6/] consisting of one census household /households of family and non-family types/	all dwellings with less than 8sq.m./ 86sq. ft/ of living area per person	dwellings with 8-12 sq.m. /86-129 sq.ft/ of living area per person	all dwellings with more than 129 sq.ft.- 12 sq.m. - of living area per person
households of single people	-	dwellings with up to 18sq.m. /194sq.ft/ of living area per person	dwellings with more than 18 sq.m. of living area per person
dwelling households consisting of 2 and 3 census households	less than 12 sq.m. of living area per person	dwellings with 12-16 sq.m. /129-172 sq.ft/ of living area per person	dwellings with more than 16 sq.m. of living area per person
dwelling households consisting of 4 and 5 census households	less than 14 sq.m. /150 sq. ft/ of living area per person	dwellings with 14-18 sq.m. /150-194 sq. ft/	more than 18 sq.m. of living area per person

x6/ the term "dwelling household "means all persons living together in one dwelling

2. Another item representing households to be allotted new flats are households living in unsatisfactory dwellings, it being presumed that half of the households in administratively divided flats and in provisory housing would be allotted a new flat[x7/].
Into the category of "unsatisfactory dwellings" there are not involved the so-called "sub-standard dwellings". It is because that the lower standard of dwellings exists in older houses which have to be replaced by new house building.

3. The calculation of the present housing needs according to the method of living standard can be expressed by the following formula:

$$P = \left[[m + n + o] \cdot \left[\frac{p + r}{v}\right]\right] + [j \cdot 0{,}5] + [k \cdot 0{,}5]$$ where:

P- present housing needs
m- total number of the second households living in dwellings inhabited by two households, in which the per capita quota of living area is inferior to 12 sq.m.
n- total number of the second and third households in dwellings inhabited by three households, in which the per capita quota of living area is inferior to 12 sq.m.
o- total number of second , third, fourth, or fifth households living in dwellings inhabited by four or five households, in which the per capita quota of living area is inferior to 14 sq.m.
p- number of dwellings in block flats
r- number of rented dwellings in one-family houses
v- total number of dwellings
j- number of dwellings in provisory housing
k- number of administratively divided flats

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x7/ an administratively divided flat is a flat which, although it is one etchnical unit, is inhabited by two or more households all of which were issued a so-called "certificate" for the individual parts of the flat.

4. Comments

i / the number of overcrowded flats inhabited by 1 census household is not involved in the calculation of the present needs.This fact does not represent a question of methodology, it is due to the Czechoslovak conditions. The number of such flats is so immense that it is not possible to calculate with its replacement in a reasonable period. These flats should be calculated in accordance with the aims of social policy and financial means.

ii/ when using the term " overcrowding of flats " , the difference has to be made between the so-called " net " and " gross " overcrowding. The " net overcrowding " represents such a theoretical situation in which such changes of flats have been made that secure the most useful exploitation of the existing housing stock. Mathematically taken, the number of net overcrowded flats is equivalent to the difference between the number of overcrowded and underoccupied dwellings. Such a calculation could be of theoretical use only. The practical aims of social policy require the calculation of the total number of households living in overcrowded dwellings without any reduction.

5. Criticism of the method

i / because of the relative simplicity of the method, it is well fit to the general long-term considerations

ii/ the method oes not make any difference among new and old dwellings

iii/ the further shortcoming of this method consists of the fact that the number of persons per habitable room is not taken into consideration. A dwelling may be taken for underoccupied if the criteria of living area per person is respected and overcrowded from the point of view of the number of person per habitable room.

B - Method of living standard combined with the number of persons per room[x8/]

1. The density of population in dwellings is measured simultaneously by two indices :

   i / by sq.m. of living area per person
   ii/ by the number of persons per room

   combined always with the number of persons in household.

   All these criteria are connected together. The criteria of overcrowding, adequate occupation and under-occupation have been, therefore, stipulated separately for every size of household, respectively for every number of persons living in one flat.

2. Criteria of adequately occupied dwellings with respect to the number of persons per room

- dwellings inhabited by 1 census household

number of persons	adequate number of rooms	adequate number of persons per room
1	1 - 1	1.0 - 1.0
2	1 - 2	2.0 - 1.0
3	2 - 3	1.5 - 1.0
4	3 - 3	1.3 - 1.3
5	3 - 4	1.7 - 1.3
6	4 - 4	1.3 - 1.3
7	4 - 5	1.7 - 1.4

- dwellings inhabited by two and more households

2	2 - 2	1.0 - 1.0
3	2 - 3	1.5 - 1.0
4	3 - 4	1.3 - 1.0
5	3 - 4	1.7 - 1.3
6	4 - 5	1.5 - 1.2
7	4 - 5	1.8 - 1.4

x8/ this method has been prepared by Jiri Musil

3. Comments:

i / the above mentioned criteria correspond to the Czechoslovak possibilities to solve the housing problem in the near future.
Our lower limit of adequately occupied dwelling inhabited by two households is equal to the criterium of minimum number of rooms taken into account in Italy. The criterium of minimum number of rooms is higher in France, Holland and Germany-West

ii/ the lower limit of number of rooms has been stipulated in such a way that it has been taken for adequacy that the members of two households cannot live in one room. That means, for example, that in case a dwelling should have been formed by two persons two rooms are taken for the minimum level. According to this principle the forecasted structure of households is anticipated as follows :

2 households - 4 persons = 1 household - 3 persons
= 1 household - 1 person
- 5 persons = 1 household - 4 persons
= 1 household - 1 person

etc

iii/
the kitchen and the rooms with more than 4 sq.m. of living area are involved in the number of rooms.

4. Criteria of adequately occupied dwellings with respect to the living area per person

- dwellings inhabited by 1 census household

number of persons	adequate living area per person - sq.m.
1	10 - 17.99
2	8 - 13.99
3	6 - 11.99
4	6 - 11.99
5	6 - 11.99
6	6 - 9.99
7	6 - 9.99

number of persons	adequate living area per person - sq.m.	- dwellings inhabited by 2 households
2	10 - 17.99	
3	12 - 17.99	
4	12 - 17.99	
5	12 - 17.99	
6	10 - 15.99	
7	8 - 15.99	

5. Comments :

The criteria mentioned previously are the conventional ones having been stipulated in accordance with the possibilities to renew the housing stock. The spatial limits are derived from the Law on Flat Management.

6. Further steps :

All dwellings are divided into three categories : overcrowded - adequately occupied - underoccupied ones[x9/].

Because of the combination of two points of view - living area and the number of persons per room - there are theoretically nine different degrees o occupation :

i / overcrowded dwellings from the point of view of sq.m. per person as well from point of view of persons per room ..... symbol " -2 "

ii/ dwellings overcrowded from the point of view of sq.m. per person but adequately occupied from the point of view of persons per room ..... symbol " -1 "

iii/ dwellings overcrowded from the point of view of sq.m. per person but underoccupied from the point of view of persons per room ..... symbol " 0 "

x9/ dwellings are taken for overcrowded in such a case if the number of persons per room overpasses the number of rooms and if the area of living does not reach the limit of adequate occupation.
The characteristics of underoccupied dwelling are of reverse relation.

iv/ adequately occupied dwellings from the point of view of sq.m. per person but overcrowded from the point of view of persons per room ..... symbol " -1 "

v / adequately occupied dwellings from the point of view of sq.m. and of persons per room as well ..... symbol " 0 "

vi/ adequately occupied dwellings from the point of view of sq.m. per person but underoccupied from the point of view of persons per room ..... symbol " 1 "

vii/ dwellings underoccupied from the point of view of sq.m. per person but overcrowdde from the point of view of persons per room ..... symbol " 0 "

viii/

dwellings underoccupied from the point of view of sq.m. per person but adequately occupied from the point of view of persons per room ..... symbol " 1 "

ix/ underoccupied dwellings from both points of view ..... symbol " 2 "

7. Calculation of the present housing needs

The calculation of the present housing needs has been prepared in two alternatives :

i / the lower one is based on the presumption that such dwellings have to be taken for overcrowded which are overcrowded from both points of view - symbol " -2 "

ii/ the higher one is based on the presumption that such dwellings have to betaken for overcrowded which are overcrowded from one point of view but adequately occupied from another one - symbol " -1 "

8. Further comments:

i / the lowest alternative of calculation represents the satisfaction of the following needs :

a/ all households living with another household in overcrowded dwelling in rented houses have to get new flats

b/ one half of the second and further households sharing overcrowded dwellings in nonrented houses / family

and farmer's houses / have the claim on separate flats

ii/ when calculating the present housing needs no difference among the flats in towns and villages is made

iii/ when enumerating the number of overcrowded administratively divided flats one criterium only - the number of persons per room - is used. It is because of the impossibility to use all conveniences in usual manner and, therefore, this fact must be compensated by larger living area

9. Additional items

i / satisfaction of needs of single households :

according to the opinion of some authors only 60-80% of households of individuals have to be taken of calculation of housing needs.
As for the Czechoslovak approach to this question, we are taking for adequacy the principle that all households, without the respect to their size, have the claim on separate dwelling. That goes for the persons living in rooms too and this kind of accomodation is not taken into account

ii/ accomodation of households living in temporary houses: besides the housing needs connected with the overcrowding, one half of census households living in temporary houses is taken into account

iii/ satisfaction of housing needs of households living in cellar-dwellings:

two points can be taken into account :

a/ the satisfaction of housing needs can be included in the balance of flats which have to be demolished in the future

b/ the housing needs are involved in the calculation of the present housing needs

As for the Czechoslovak practice, a part / 1/2/ of these needs is involved in the balance of the present housing needs.

10 . The whole procedure of estimation of the present housing needs according to this second method can be expressed by the following formula :

$$P = P_1 + |P_2 \cdot 0.5| + |P_3 \cdot 0.5| + P_4 + |P_5 \cdot 0.5| + |P_6 \cdot 0.5| + P_7 + |P_8 \cdot k|$$

where :

P - present housing needs
P_1- number of overcrowded rented dwellings inhabited by two and more households
P_2- number of overcrowded no-rented flats inhabited by two and more households / flats in family and farmer's houses/
P_3- number of overcrowded non-rented dwellings inhabited by two and more households
P_4- number of overcrowded administratively divided flats
P_5- number of dwellings in temporary buildings
P_6- number of cellar-dwellings
P_7- number of dwellings for households living in hotels
P_8- number of dwellings for households living independently but in very overcrowded dwellings

x10/ besides these items the fully satisfaction of needs of households living in hotels is calculated. This item is small and it is enumerated on the level of the whole state only.

Calculation of the present housing need - 1961

a/ lower alternative - dwellings overcrowded from both points of view

regions	P_1	$P_2 \cdot 0,5$	$P_3 \cdot 0,5$	P_4	$P_5 \cdot 0,5$	total
Czech	46,360	49,615	1,416	8,014	4,398	109,803
Slovak	10,647	58,861	384	351	321	70,564
CSSR	57,007	108,476	1,800	8,365	4,719	180,367

b/ higher alternative - dwellings inhabited / overcrowded / from one point of view

Czech	71,594	74,730	2,564	8,014	4,398	161,300
Slovak	15,093	70,916	783	351	321	87,464
CSSR	86,687	145,646	3,347	8,365	4,719	248,764

Calculation of additional items :

i / number of households living in hotels : total 6,000

ii/ number of households living independently but in very overcrowded dwellings :
there are about 93,000 of such households. It has been assessed that at least one half of htese households would claim to new dwellings

iii/ dwellings for a half of households living in cellar-dwellings - 21,500 dwellings

iv/ dwellings for households living in shared but not overcrowded dwellings :
about 22,000 second households lived in the category of adequately occupied dwellings. It has been assessed that about a half of these households would claim to

new dwellings.

Recapitulation of the Czechoslovak present housing needs in 1961 - according to the higher alternative

Characteristic	Number of dwellings
Dwellings needed to abolish overcrowded dwellings inhabited by two and more households	250,000
Dwellings for households living in hotels	6,000
Dwellings for households living independently but in very overcrowded dwellings	46,500
Dwellings for a half of households living in cellar-dwellings	21,500
Dwellings for households living in shared but not overcrowded dwellings	11,000
Total present housing need	335.000

A-III. Conclusions

1. The calculation of the present housing needs [xll/] forms the basis for the estimation of the housing situation.
   When using the term " present housing need "it is usually meant by that the enumeration of deficiency in dwellings / in the number and structure / which has to be abolished in order to achieve some minimum social standards or some level of satisfaction of subjective demands of inhabitabnts. This deficiency, measured by objective criteria, is characteristic for most countries in the world.
   In case we use the measure of subjective demand for the estimation of the housing situation then it is questionable wether to take these demands for the present or future need.
   The subjective demands are usually used as a method for the assessment of future need. I dare say that it is not correct. The future need is derived from the number of future inhabitants, their future demographic structure, then from the future number and structure of households, their formation being again dependent on the future economic and social changes.
   Housing demands, although being able to be satisfied in certain future period, nevertheless they are based on the present state of imagines and on the present evaluation of possibilities of present population in its present structure.
   It can be concluded, therefore, that the estimation of the present housing need has not always to mean a deficiency of dwellings but that the present housing need always exists as a certain potential factor which has to be distinquished from the future need.

xll/ recomendation of ECE

As for the estimation of the volume of the present housing need, it depends on the criteria chosen for the expression of the "need". These criteria will also involve the economic situation and social policy of individual countries.

2. The methods of estimation of the objective present housing needs mentioned previously have been based on the calculation and evaluation of data puting together all categories of households. This procedure is enabled by the fact that the social basis of Czechoslovakia shows very small differencies. In other case it would be necessary to analyse the present housing needs according to characteristic social-economic groups of population.

3. The use of demonstrated methods is conditioned by certain system of evidence, respectively of census. In addition to it, the results of these calculations depend mostly on the definitions which have been used. The main problem consists of the definition of "household". One of the possibilities consists of the classification of households according to the relationship of people forming them and the other of construction of so-called "census households" in the course of coding the informations contained in the census questionnaire. Both methods allow an estimation of the number of "potential" households and, therefore, of the present housing need.

B . Planning of decreases of housing stock

1. The decreases of dwellings depend on the state of the housing stock on one side and on the possibilities of replacing the demolished houses by new buildings on the other.
When forming the policy of replacement of unsatisfactory housing stock, two points of view should be judged :

i / the faster the replacement of existing housing stock will be undertaken the more will the space for the quantitative solution of housing problem be restricted.
The relation need not to be linear. Just on the contrary. Since the old housing stock is overcrowded in most cases, it is usually necessary to build a greater number of new dwellings than the number of the demolished ones.

ii/ the greater the volume of demolished housing stock will be, the more its quality will be improved.

The volume of the housing stock to be demolished in certain period will, therefore, form a part of the global economic policy and with respect to the manifold relations of this aspect of the policy it will be useful to prepare several alternatives forming a part of the whole national economic development plan.

2. Claims to be laid on the methods of calculation of prospective decrease of housing stock:

i / the reality of the results in respect to the possibilities to ensure the compensation of old housing/ the production capacity, financial means, design preparation /

ii/ the objectivity of results and the universal applicability in all parts / regions / of the state.

iii/ the maximum simplicity

3. Aspects of the Czechoslovak methods:

i / complete compensation of decreases of housing stock due to the investment activity of other branches /roads, building of dams, mining etc/

ii/ successive compensation of the housing stock owing to its age

B-I. Calculation of decreases of housing stock due to its physical wear

1. Principles

The method is based on the presumption of the successive decrease of the physical and moral value of the housing stock. We do not take it possible to separate the moral value from the physical one on the level of the global housing policy. It is, therefore, presumed that the factors of age of the housing stock and of the sort of material which had been used for the construction involve both points of view of the value. It means that the moral and physical value is decreasing in relation to the increase of the age of the houses.

In this principle there are, therefore, accepted the following additional points of view :

- the economic one expressing the unefficiency of reconstruction
- the architectural one, which considers the overaged housing stock as an architectural defect

It is evident that such simplificated considerations can be used on the level of macro-balances of housing needs only. The decision concerning the demolition of concrete houses will be always based on detailed calculation and consideration.

In order to get most closely to the real process of demolitions and to the fact that the process of decrease of housing stock is not in linear relation to the increase of age of houses, we had to base the method on the thorough analysis of the past course of the decrease of the housing stock.
Limited financial means and construction capacities are facts to be respected by this method.

At the end of this introduction I should like to emphasize that the method does not serve to the stipulationof

the volume of decreases of the housing stock to be replaced in the whole country in a certain period.
For this purpose there are more suitable broader political and economic considerations grounded on financial, material and capacity balances.
The method does serve to the objective distribution of the stipulated quota of compensation of the decrease of the housing stock into individual regions in compliance with the age of the housing stock and its material structure.

2. Description of the method[x12/]

i / the survey of the decrease of the housing stock has been carried out in 82 settlement units of different size, function and architectural composition situated in 7 different regions.
The total number of dwellings amounted to 81,659 units at the time of the census, that is 2,14% of the total sum of dwellings in Czechoslovakia

i i/the housing stock ascertained by this survey has been classified according to the age, prevailing building material, differentiating between one or more flats houses. This differentiation replaced the grouping of houses according to its sort : family and farmer's houses, flat blocks and it is supposed that these classifications are equal.

x12/ the method has been prepared by TERPLAN and Research Institute for Building and Architecture, Praque.

iii/ the number of dwellings ascertained by the survey and the number of dwellings having been demolished in the period of 1961-64 / during 4 years / has been enumerated in each group, that is in the group of age and of prevailing building material

iv/ the structure of the housing stock in Czechoslovakia classified according to the same criteria and the total quota of newly built houses in order to replace the decrease of the housing stock due to the age and sanitation formed further items of the balance

v /the structure of the housing stock ascertained by the survey must correspond to the structure of the housing stock in the whole country, otherwise further steps cannot be undertaken

vi/ the number of houses to be demolished / in each group/ has to be equal to the quota of new houses destined for the replacement of the decrease of the housing stock .

3. Further steps :

i /the first step is represented by the enumeration of the hypothetical volume of the decrease of the housing stock which should occur in the whole country in the period of 1961-70 if the course of the decrease of the housing stock would correspond to the one in individual groups as ascertained by the survey. Such of decrease is being called "assumed present decrease" .

footnote : the volume of the assumed decrease is not the real one but such a one which should have to be if the relation between the volume of decrease, age of housing stock and type building material would be preserved. This relation, however, has not been fixed by objective calculation but ascertained by the sample survey.

ii/ further step involves the stipulation of coefficients of future decrease of housing stock according to the classification groups in individual periods.
These coefficients are stipulated on the base of ratio between the fixed quota of new flats replacing the future decrease and the present assumed decrease and on the base of ratio between the volume of decrease and the number and structure of housing stock ascertained by sample survey

iii/ with the use of these coefficients there has been computed the future assumed decrease of housing stock in individual periods corresponding, as far as the total sum is concerned, to the stipulated quota of the new house building destined to the compensation of the decreases. For this work the computer is being used

iv/ the coefficients have been stipulated differently for 3 periods in accordance with the quotas of new housing construction :

I . period 1961-70 ..... 150,000 new flats
II . period 1971-75 ..... 180,000 " "
III. period 1976-80 ..... 295,000 " "

3. Detailed description of the calculation

i / the computation of assumed volume of future decrease of housing stock has been restricted to the four materials only - stone , bricks , wood , unbaked briks -.

This is because of the small part of other building materials in the whole structure / 3,01 % ascertained by the sample survey / and of the fact that in these " other " material groups none decrease has been ascertained/ materials mostly used int the last period /.

ii/ as for the age of the housing stock and its decrease, it was decided to take into account only the houses built up to the year 1950

iii/ after these corrections the relative volume of decrease of housing stock in individual classification groups has been computed.
The number of flats having been fixed in the sample survey is being marked " n_{ijk} ", where :

index i = 0, 1 , 2 , ... 6 means the age group :

i = 0 ..... = age not ascertained
i = 1 ..... = flats in houses having been built up to 1859
i = 2 ..... = flats in houses having been built in the period 1860 - 1879
i = 3 ..... = " " 1880 - 1899
i = 4 ..... = " " 1900 - 1919
i = 5 ..... = " " 1920 - 1939
i = 6 ..... = " " 1940 - 1950

j = 1, 2 , 3 , 4 means the buiding material
j = 1 ..... = stone
j = 2 ..... = bricks
j = 3 ..... = wood
j = 4 ..... = unbaked bricks

k = 1 , 2 means the type of building
k = 1 ..... = oneflat houses
k = 2 ..... = more flats houses

The absolute volume of decrease / during 4 years / in individual classification groups of housing stock ascertained in the survey is being marked " x_{ijk} ", the meaning of indexes "ijk " being the same as mentioned previously.
The relative volume of decreases / during 4 years / in individual groups is given by the ratio

$$\frac{x_{ijk}}{n_{ijk}}$$

This value transformed in the portion of decrease per 1 year is being marked " p_{ijk} ".

iv/ further step consists of computation of the present assumed decrease covering the whole republic in the period of 1961 - 70 / period " I "/.
This present assumed decrease of housing stock is gained by multiplication of number of flats in individual groups / " N_{ijk} " = number of flats in Czechoslovakia /, by the corresponding values $p_{ijk} \cdot 10$ / relative volume of decrease according to the survey per one year multiplied by the lenght of the first period - 10 years /:

$t_{ijk} = N_{ijk} \cdot p_{ijk} \cdot 10$, where t_{ijk} = present assumed decrease in Cz. in individual groups

The total present assumed decrease of housing stock in Czechoslovakia in the first period is expressed by the formula :

$$T_I = \sum_{i=0}^{6} \sum_{j=1}^{4} \sum_{k=1}^{2} t_{ijkI}$$

v / the relation between the stipulated quota of new house building - S_I - and present assumed decrease of housing stock is given by the ratio :

$$r_I = \frac{S_I}{T_I}$$

This ratio represents the corrective factor - r_I .
When multiplying the values p_{ijk} / relative volume of decrease of housing stock of survey per 1 year / by this corrective factor - r_I - and by the number of years of the period, we get the coefficients of the final decrease in the first period - " k_{ijkI} ".

$$k_{ijk} = r_I \cdot p_{ijk} \cdot 10$$

vi/ the final decrease in individual groups in the country is given by this formula :

$$R_{ijkI} = k_{ijkI} \cdot N_{ijk}$$

The total volume of final decrease in the first period is given by the addition :

$$RI = \sum_{i=0}^{6} \sum_{j=1}^{4} \sum_{k=1}^{2} R_{ijkI}$$

vii/ further steps covering the second and third period are quite analogous . The difference lies only in the lenght of these periods and in the volume of quotas of new housing construction owing to the decrease of the housing stock.
There is no need to calculate the present decrease because of the relation : $T_{II} = T_{III} = 1/2\ T_I$

The corrective factors are stipulated according to the following ratios :

$$r_{II} = \frac{S_{II}}{T_{II}} = \frac{2\ S_{II}}{T_I}$$

$$r_{III} = \frac{S_{III}}{T_{III}} = \frac{2\ S_{III}}{T_I}$$

viii/ the coefficients of final decreases in the second and third period are computed on the base of following ratios :

$$k_{ijkII} = r_{II} \cdot p_{ijk} \cdot 5$$

and

$$k_{ijkIII} = r_{III} \cdot p_{ijk} \cdot 5$$

ix/ the volume of final decrease of housing stock in individual classification groups in the second period is given by :

$$R_{ijkII} = k_{ijkII} \cdot N_{ijk}$$

The total volume of final decrease of housing stock in the second period :

$$R_{II} = \sum_{i=0}^{6} \sum_{j=1}^{4} \sum_{k=1}^{2} R_{ijkII}$$

x / the calculation of the total volume of final decrease of housing stock in the third period :

$$k_{ijkIII} = r_{III} \cdot p_{ijk} \cdot 5 \qquad / 1/$$

$$R_{ijkIII} = k_{ijkIII} \cdot N_{ijk} \qquad / 2/$$

$$R_{III} = \sum_{i=0}^{6} \sum_{j=1}^{4} \sum_{k=1}^{2} R_{ijkIII} \qquad / 3/$$

xi/ when using this method, it is theoretically possible that the volume of final decrease of housing stock / in any period / could surpass the volume of existing housing stock in any one of the classification group. This theoretical possibility is due to the f act that the calculation in all periods are coming out from the same base of housing stock in individual classification groups.

For this reason the restrictive condition must be included into the calculation :
the total sum of decrease of housing stock in individual classification groups in all three periods must be lower or equal to the number of flats in corresponding groups :

$$R_{ijkI} + R_{ijkII} + R_{ijkIII} \leq N_{ijk} \qquad / 1/$$

If this relation / 1/ is valid for sum total of decrease of housing stock in individual classification groups, then the following relation is valid for coefficients of decrease :

$$k_{ijkI} + k_{ijkII} + k_{ijkIII} \leq 1 \qquad / 2/$$

It is also possible that the sum total of coefficients of the first and second period might be lower than 1:

$$k_{ijkI} + k_{ijkII} \leq 1 \qquad /3/$$

but the sum total of coefficients of all three periods would be higher than 1 :

$$k_{ijkI} + k_{ijkII} + k_{ijkIII} = m_{ijk} > 1$$

For this reason the following procedure has been prepared:

a/ the groups showing the relation :

$$k_{ijkI} + k_{ijkII} + k_{ijkIII} \leq 1$$

are marked " B " and the groups showing the relation /3/ are marked " A " .

b/ in order to achieve the relation /2/ also in the groups of the set " A " the coefficients k_{ijkIII} are replaced by other ones - k^{o}_{ijkIII} - having been stipulated in the following way :

$$k^{o}_{ijkIII} = 1 - \left| k_{ijkI} + k_{ijkII} \right|$$

c/ the values " $m_{ijk} - 1$ " are alloted proportionaly to all groups of the set " B " .
To enable it, it is necessary to stipulate :
- the volume of the present assumed decrease of housing stock of the set " B " in the third period:

$$T'_{III} = T_{III} - \sum_{i=0}^{6} \sum_{j=1}^{4} \sum_{k=1}^{2} t_{ijkIII} \cdot 00$$

where 00 = $\begin{cases} 0 \text{ is valid for the groups of the set " A "} \\ 1 \qquad\qquad\qquad\qquad\qquad\quad \text{" B "} \end{cases}$

- the quota of new housing construction valid for the set "B" :

$$S'_{III} = S_{III} - \sum_{i=0}^{6} \sum_{j=1}^{4} \sum_{k=1}^{2} R^{o}_{ijkIII} \cdot 00$$

where $R^{o}_{ijkIII} = N_{ijk} \cdot k^{o}_{ijkIII}$ represents the final decrease of housing stock in individual groups of the set "A".

d/the corrective factor valid for the groups of the set "B" is given by the ration:

$$r'_{III} = \frac{S'_{III}}{T'_{III}}$$

e/the coefficients of the decrease of housing stock in the groups of the set "B" are computed with the use of the new corrective factor according to the formula :

$$k'_{ijkIII} = r'_{III} \cdot p_{ijk} \cdot 5$$

f/the final decrease of the housing stock in individual groups of the set "B" is given by the relation :

$$R'_{ijkIII} = N_{ijk} \cdot k'_{ijkIII}$$

g/the total final decrease of the housing stock valid for the third period is given by the sum total of final decreases of the sets "A" and "B" :

$$R_{III} = \sum_{i=0}^{6} \sum_{j=1}^{4} \sum_{k=1}^{2} \left[00\, R^{o}_{ijkIII} + \left| 1 - 00 \right| R'_{ijkIII} \right]$$

4. Alternative method of the calculation of the final / future/ assumed decrease of the housing stock

i / the alternative method takes into consideration the influence of the successive losses of the housing stock in individual periods and of successive ageing of the housing stock

ii/ the procedure of the calculation of the final decrease in the first period is equal to that mentioned previously

iii/ the final decrease of the housing stock in the second period is calculated in the following way:

a/ first the final decrease of the housing stock in individual classification groups in the first period is deducted from the sum of the total housing stock in Czechoslovakia in the first period :

$$N_{ijkII} = N_{ijkI} - R_{ijkI}$$

b/ the values p_{ijk} / relative volume of the decrease of the housing stock / will involve now the factor of ageing and they will be, therefore, different in individual periods. The values p_{ijkII} can be calculated by linear interpolation of the values p_{ijkI}

c/ the present assumed decrease of the housing stock in individual groups in the second period is gained by the multiplication of the volume of the housing stock in individual groups in the second period by the values of p_{ijkII} and by the number of years of the second period:

$$t^{2/}_{ijkII} = N_{ijkII} \cdot p_{ijkII} \cdot 5$$

Total present assumed decrease is given by the sum total :

$$T^{2/}_{II} = \sum_{i=0}^{6} \sum_{j=1}^{4} \sum_{k=1}^{2} t^{2/}_{ijkII}$$

d/ the procedure of the calculation of the corrective factor is the same as in the first method :

$$r^{2/}_{II} = \frac{S_{II}}{T^{2/}_{II}}$$

e/ the calculation of coefficients of final decrease of the housing stock is analogous :

$$k^{2/}_{ijkII} = p_{ijkII} \cdot r^{2/}_{ijkII} \cdot 5$$

In the first method the sum total of values of coefficients of the final decrease of the housing stock had to be lower or at most equal to 1. In this method the same condition must be fulfiled in each individual period. Otherwise it is necessary to distribute the part of coefficients surpassing " 1 " in the way described in the first method

f/ the calculation of the final decrease of the housing stock in individual classification groups and its total volume is carried out according to the following formulas :

$$R^{2/}_{ijkII} = N_{ijkII} \cdot k^{2/}_{ijkII}$$

and

$$R^{2/}_{II} = \sum_{i=0}^{6} \sum_{j=1}^{4} \sum_{k=1}^{2} R^{2/}_{ijkII}$$

iv/as for the calculation of the decrease of the housing stock in the third period, the procedure is analogous to that used in the second period :

$$N_{ijkIII} = N_{ijkII} - R^{2/}_{II} \qquad \neq 1/$$

$$t^{2/}_{ijkIII} = N_{ijkIII} \cdot p_{ijkIII} \cdot 5 \qquad / 2/$$

$$T^{2/}_{III} = \sum_{i=0}^{6} \sum_{j=1}^{4} \sum_{k=1}^{2} t^{2/}_{ijkIII} \qquad / 3/$$

$$r^{2/}_{III} = \frac{S_{III}}{T^{2/}_{III}} \qquad / 4/$$

$$k^{2/}_{ijkIII} = p_{ijkIII} \cdot r^{2/}_{III} \cdot 5 \qquad / 5/$$

$$R^{2/}_{ijkIII} = N_{ijkIII} \cdot k^{2/}_{ijkIII} \qquad / 6/$$

$$R^{2/}_{III} = \sum_{i=0}^{6} \sum_{j=1}^{4} \sum_{k=1}^{2} R^{2/}_{ijkIII} \qquad / 7/$$

v / contrary to the first method which takes the whole problem too statioly, the second method could be used even for the distribution of new housing construction in yearly periods.

B-II. Compensation of decreases of the housing stock due to the building activity of other branches

As mentioned previously full compensation is calculated.

The assessment of the volume of these losses of the housing stock are taken over from the development plans of individual entreprises and branches.
The losses of the housing stock and their full compensation form a part of the economic efficiency analysis done by the entreprises requiring the bank-credit.
This item of decreases of the housing stock can be assessed relatively precisely when covering the period of about 5 years only. When preparing the long-term plan, it is desirable to calculate with a reserve in the balances of the housing construction. But the volume of this item is very small with respect to the volume of decreases of the housing stock due its physical wear.

C - Calculation of the future housing needs

I. Definition of the future housing needs

The future housing needs are arising from :

i / the increase of the number of households /due to the natural and migration increase of population/

ii/ the decreases of the present housing stock

iii/ the transformation of the existing flats into nonhabitable purposes

The future housing needs can be generally expressed by the following formula :

$$B = |g_{t^1} - g_{t^0}| + h_{t^0-t^1} + i_{t^0-t^1} + r_{t^0-t^1}$$, where :

B - future housing needs

g_{t^0} - number of households ascertained at the time of the census

g_{t^1} - number of households in the future period

h - increase or decrease inthe number of households due to the migration of inhabitants

i - assessed number of demolished flats in the period taken into account

r - reserve flats to cover the requirements due to the migration within one region

The future housing needs are stipulated on the base of certain objective measures the most important of which is the future number of households, that is the social-demographic factor.

This fact leads to the following conclusions :

a/ the stipulation of future objective housing needs is possible only when it takes into account some sufficiently great and homogeneous community

b/ the stipulation of future housing needs has a special importance for the preparation of the long-term development plans.
For the purposes of the short-term planning it is more useful to supplement the method of stipulation of objective needs by the investigation of subjective demands

c/ the stipulation of objective housing needs is conditioned by developed system of demographic statistics.

As for the individual items of the calculation of the future housing needs, we are dealing in this chapter with the following ones :

a/ the increase of the number of households
b/ the migration of population within a region

The item " the transformation of existing flats into the nonhabitable purposes " is less important and its course can be regulated by legal rules.

II. Methods of calculation of future number of households

1. The method of so-called complete families

i / the base of this method is formed by the calculation of future number of census households which is grounded on the assessment of the number of so-called complete families

ii/ the calculation of so-called complete families is based on the presumption that the number of complete families is equal to the future number of married women/ in individual age groups/

$$F_c^t = \frac{W_m^t}{100} \cdot p^t \quad , \text{ where :}$$

F_c^t - number of complete families in time " t "

W_m^t - future number of women in time " t "

p^t - ratio of married women in corresponding age group in time " t "

The future number of married women / in individual age groups / is derived from an analysis of the course of the marital status in individual age groups in the past periods.
The relation between the age and marital status shows relative stability / differencies in regions ń, slight increase of marriages can be counted with

iii/ the number of so-called " incomplete families " is derived from the ratio of incomplete and complete families ascertained by the census / in Praque, for instance, this ratio is 13,9 incomplete families to 100 complete ones /

iv/ the number of households of nonfamily types including a greater number of members is stipulated in the same way

v / the number of households of single persons is assessed on the base of ratio between the total sum of households and the sum of households of the previously mentioned 3 types in individual age groups / with differentiation of individual parts of the country with respect to the tradition in the way of life, degree of urbanization etc/

vi/ the use of the described method is conditioned by the provision of separate calculations covering individual characteristic areas differing by demographic and economic structure, the way of life

vii/ the improvement of the procedure can be reached by introducing the analysis of trends between two censuses.

2. "Headship - rate" method

i / this method comes out from the presumption that the number of main income providers, resp. of heads of households is equivalent to the number of households

ii/ the assessments of the number of households provided by this method involve the presumption that the number of inhabitants as well as the number of heads of households have been analysed in the census according to the same groups of age, sex, marital status and then that the projection of the future development of inhabitants can be prepared for the same groups

iii/ the principle of this method consists of ascertainment of the sex, age, marital status of heads of households of individual types at the time of census.

On the basis of the ratio of the heads of households to the total population classified according to the age, sex and marital status, the detailed coefficients are gained and used / whether in ascertained or modified value / for the calculation of the future number of households of individual types.

The calculation is being provided for individual groups of sex according to the following formula :

$$D_t = \sum \frac{H_s\ a, b, c, d}{P_s\ a, b, c, d} \cdot P_t\ a, b, c, d$$

where:

D_t = number of households / of investigated type / in the year "t"

H = heads of households / of investigated type /

s = indexes of census

P = population

t = investigated period

a = sex

b = age group

c = marital status

d = type of household

Further type of calculation :

$$D_t = \frac{P^t\ a,\ b,\ c,\ d}{100} \cdot k^t\ a,\ b,\ c,\ d$$ where :

P^t = future population in the time "t"

k^t = coefficient of the artio of number of persons heading the households

If the whole married couple is considered to represent the head of households which is more precise than taking into account one sex only, it is necessary to take the number of complete families for an average of the total sum of the number of men and women.

3. Evaluation of both methods

i/both methods are based on the exploitation of demographic data.

If the total balance has to respect the specific features of individual territorial units, it is necessary to proceed from the smaller territorial units to the greater ones

ii/

the headship-rate method has the following adventages in comparison with the method of complete families :

a/ the process of ageing of inhabitants is taken into account

b/ the changes of marital status mostly influencing the structure and the number of households are respected

iii/

the presumption of the possibility of making equal the number of married women with the number of complete families is not quite correct. Many married women/ and men / are the heads of another type of families than that of complete ones. / It has been found that almost 1% of married persons lived outside the complete families and on the contrary almost 1,5% of complete families formed the unmarried women and men / .

iv/ both methods cannot be used without some corrections due to economic and social changes influencing the future number and structure of households.
It is , therefore, useful to elaborate alternate projections of households/ minimum - maximum /.

v / In the Czecholosvak praxis the combination of both methods is being used. The method of so-called complete families is being used for the estimation of the households of complete family types.
The headship-rate method is being used for the estimation of uncomplete families, of nonfamily households with two and more members, of households of single persons.

3. Evaluation of the methods

i / the first method proved entirely incorrect since it identified the structure of all households ascertained statistically over the whole country with that of the households actually moving into new dwellings. Apart from this, the first method presumes a change of dwelling as soon as the number of the members of every household increases or decreases by one person. Since in the period of a quantitative shortage of dwellings, exchange of dwellings is very difficult and since the households that decrease / usually those of parents after the departure of their children / do not feel inclined to leave their dwellings / which are often too large for their needs /, this method cannoth be used.

ii/ the second method departs from the principle that the structure of new dwellings should correspond, in the first place , to the structure of the first households moving into new dwellings, where they would grow until they reached their maximum size. This method, however , raises its own problems. This pertains particularly to the long-term exploitation of large residential estates the housing structure of which was determined by this method. The housing structure, which is suitable in the first twenty years of existence of a housing estate, will cease to be suitable in the time when the second generation of its inhabitants begins to form their own families. It is then that the difficulties connected with the common living of three gemerations in one dwelling will manifest themselves and the danger will arise that the young people will move away from the estate because of the lack of adequate dwellings. Some years later the estate will not have a sufficient number of dwellings for old people. All these difficulties will have one common denominator, it is a shortage of adequate dwellings for smaller households.

footnote : this chapter has been prepared by Jiri Musil

This problem will be the more acute the smaller the number of old people or other small households that move to the new housing estate at the time of its origin.[x13/]

In case the quota of small households and consequently also that of small dwellings in new housing estate is extra small, it is necessary to take some preventive measures of a town planning character. The best measure is to reserve some territory intended for the additional construction of dwellings of such sizes as may be lacking in the housing structure of the estate.

iii/ the third method of estimating the size distribution of dwellings, should it be consistently used, would lead to the construction of such dwellings of only such sizes as are lacking in the housing stock. This may be impossible, and in Czechoslovakia it is this case because the dwellings with a small number of rooms are generally prevailing, because every bigger housing estate ensemble should have, as far as possible, a balanced housing structure comprising a certain percentage of all size categories of dwellings. Apart from this, this third method would require, especially in Czechoslovakia, a great number of dwellings changes and would condemn all smaller households to living in older and smaller dwellings with lower standards of amenity and hygiene. Should this method be practically used - it is known to have been recommended by Economic Commission for Europe - it would necessitate the planning of a ceratain number of new small dwellings for one and two persons. This means, however, that this method does not differ considerably from the second method. It is necessary to add that this third method is correct in long-term plans in which it determines the principal trend of house building. Actually it represents the determination of the long-term aims of housing policy.

4. From the point of view of costs of an average dwelling the first method is least expensive, while the third method, when applied consistently, is the most expensive.

5. On the basis of an analysis of the advantages and drawbacks of the three methods mentioned previously it can be said that in the period of housing shortage the most suitable method is the second one.
It is necessary to add that actually the second method, too, partly realizes the aims inherent in the third method. Even the application of the second method improves the relation between the size of households and the size of dwellings in the whole housing stock since it reduces the average number of people per habitable room, above all through reduction of the number of census households which live together.

6. Assessment of the housing structure according to the average maximum household size

   i / on the basis of surveys carried out on new housing estates and lately also in territories intended for clearance it can be assumed that the average maximum size of households in newly built dwellings is determined by the size and frequency of currence of :
   a/ developing households
   b/ households coming from demolished dwellings
   c/ households moving into new dwellings from old dwellings not intended, however, for clearance
   This classification of households has shown that the average size of households moving into new dwellings in various territories depends to a considerable extent on the number of demolished dwellings.
   The larger the number of demolished dwellings, the smaller the average size of households moving into new dwellings

ii/ the whole calculation of the average maximum household size in new flats can generally be expressed by the following formula which is actually a weighted mean of the individual items composing the future households in new dwellings :

$$D_p = \frac{/ D_r \, x / + / D_n \, y / + / D_s \, z /}{x + y + z}$$

in which

D_p = average size of households in new dwellings

D_r = average size of households from demolished dwellings

D_n = average maximum size of developing households

D_s = average size of households from older dwellings not intended for clearance

x = percentage of households from demolished dwellings

y = percentage of developing households

z = percentage of households from older dwellings not intended for clearance

Values " D_r " for the individual regions were derived from the results of the census. Since the data of clearance and demolitions affer in the great majority of cases to dwellings built prior to 1900, we can consider the statistical data on the average size of households living in houses built prior to 1900 as a good basis for our calculations.
Values " D_n " are derived from the survey of the " planned parenthood " carried out by the state Population Committee in the year 1959. This survey revealed how many children are " planned " in the families residing in the Czech and Slovak regions.

In view of the fact that some of the "planned" children die and to the fact taht we consider the maximum size of families living in blocks of flats built mostly in towns, the average number of "planned" children is slightly reduced in comparison with the results of previously mentioned survey, which consequently reduces also the maximum size of developing families.

Number of children desired by parents in Czechoslovakia

Regions	no children	one child	two child.	three child.	four or more
Czechoslov.	1,2	9,2	48,6	27,5	13,5
Czech	1,3	10,1	51,2	24,8	12,6
Slovak	0,7	6,3	39,8	36,7	16,5

Values "D_s" represent average sizes of census households in all dwellings in the individual regions as ascertained by the census.

Values "x" vary in accordance with the respective region. According to the present estimates this value will vary between 15 and 42 per cent in the individual regions. Should we consider smaller territorial units than the regions, the difference between the maximum and minimum values of "x" would be bigger.

Values "y" depend on the number of demolished dwellings and on the quota of dwellings efor households moving from older dwellings which are not intended, however, for demolition. It generally applies that

$$y = 100 - / x + z /$$

Values "z" were determined on the basis of experience amassed by local authorities and amount on the average to 15 per cent. This means that 15 per cent of all newly built flats are allotted by the local authorities to households living in defective dwellings, to households changing dwellings and to migrating households. To the constant 15 per cent we have added further households of the same size who move into new dwellings because of changes connected with the demolition of old houses. On the basis of analyses of the social situation of people coming from old dwellings intended for clearance we can assume that they will represent some 10 per cent, so that

$$z = 15 \frac{x}{10}$$

Since also in new dwellings a certain number of cases will occur when one dwelling is inhabited by two or even more census households, the average size of maximum developed households in new dwellings must be increased. From the data obtained by the census it is possible to assume that this increase would represent 3 per cent in Czech regions and abot 4 per cent in Slovakia.

iii/ the maximum average household size alone does not afford sufficient data for determination of the percentage of new dwellings of the individual sizes. It is necessary to convert it into household structure in accordance with the number of households members. The household structure can be derived from a known average by some theoretical method, such as by the application of Poisson's frequency distribution curve.

iv/ the use of Poisson's frequency distribution curve is based on the following considerations :

a/ the origin, increase, duration and the break down of households represent the factors repeating in great quantity of cases under the relatively same conditions and , therefore, they should obey the rules of mathematical statistics

Further steps :

a/ in order to achieve that the mark "x " will gain the values from "1 " / it is of no use to consider the households with the number of members equal to 0/ the transformation of the previously mentioned formula will be undertaken as follows :

$$p/x/ = \frac{e^{-\lambda'} \cdot \lambda'^{x-1}}{/x-1/\,!}$$, for x= 1,2, ... where

means the average of transformated frequency distribution

b/ the second step involves the computation of the average size of households λ in dependence upon the average of the transformated frequency distribution :

$$\lambda = \sum_{x=1}^{\infty} x \cdot \frac{e^{-\lambda'} \cdot \lambda'^{x-1}}{/x-1/\,!} =$$

$$= \sum_{x=1}^{\infty} /x-1/ \frac{e^{-\lambda'} \cdot \lambda'^{x-1}}{/x-1/\,!} + \sum_{x=1}^{\infty} \frac{e^{-\lambda'} \cdot \lambda^{x-1}}{/x-1/\,!}$$

$$= \lambda' + 1$$

That means that the average of the transformated frequency distribution has decreased by one, that is:

$$\lambda' = \lambda - 1$$

c/ for the practical procedure it is most advantageous to use the transformations formulae as follows :

I : $x' = x-1$

II : $\lambda' = \lambda - 1$

III: $p/x/ = \frac{e^{-\lambda'} \lambda x'}{x'!}$

will give the frequency of the distribution of the mark x' for the average .

The results will be transformated back in compliance with the formulae : $\lambda = \lambda' + 1$

$x = x' 1$

d/ the additional step should involve the comparison of the application of Poisson's frequency distribution curve with the verified and analysed results of the census.
The differencies between the theoretical results and the ascertained frequency of the structure of households might be used for eventual corrections of the future frequencies of the structure enumerated by the formulae mentioned previously

iv/ so far a simpler empiric method has been used, based on empiric ascertainment of the relation between the average sizes of households comprising 2,75 to 3,95 people and the percentage of households comprising 1 to 6 and more persons

v/ the final step in the determination of a suitable housing structure is the transformation of the empirically assessed household structure into the conditions ascertained on the new housing estates where there is always a larger quota of households of medium size and a smaller quota of small and large-sized households. This means that the average household structure in old residential areas as ascertained in the individual districts or towns will differ from that on new housing estates even if the average size of households be the same in both cases, Statistically speaking, the dispersion of sizes of households abot the average on new housing estates is smaller than in old settlements, and the frequency curve of households classfied according tb the number of their members is steeper in new dwellings. More precise determination of this household size frequency curve has not yet been carried out mathematically.
For this reason these deformations can be estimated only with the aid of empiric data acquired by means of various surveys.

On the basis of these surveys a final table was compiled giving the structure of households in new housing estates at the time of the amximum development of the size. To illustrate the difference between both types of household structures I am giving below the respective data for a typical average size of 3,65 people per household :

method of determination of the structure of the households	percentage of households incorporating the following numbers of people					
	1	2	3	4	5	6 and more
empiric	8,3	21,9	20,8	21,7	14,0	13,3
modified for new housing estates	3,0	15,1	28,3	34,0	13,8	5,8

Housing programming - summary of indexes

global index	detailed classification of the index	unit
	A- Data ascertained by the census	
Housing stock	Categories of the housing stock according to the type of houses : - family houses - farmer's houses - dwelling houses - other buildings	- number of houses - number of dwellings
Housing stock	Type of occupation - houses and dwellings occupied : - permanently - temporally - unoccupied	- number of houses - number of dwellings
Housing stock	Type of accomodation : - houses for unmarried persons - student colleges - pensioner's houses	- number of accomodation facilities - number of habitable rooms - living area - number of persons
Dwellings	Set of permanently occupied dwellings classified according to the type of building - family houses - farmer's houses - dwelling houses - other buldings	- number of habitable rooms - living area - number of households persons

global index	detailed classification of the index	unit
	A - Data ascertained by the census	
Housing stock	Classification according to the building material : - stone - bricks - unbaked bricks - wood - other materials	- number of permanently occupied houses - number of permanently occupied dwellings
Housing stock	Classification with respect to the period of construction	"
Dwellings	Type of conveniences : - -	- number of dwellings - number of persons
Census households	Type of houses	- number of census households
Census households	Housing stock - classification with respect to the period of construction	- number of census households

global index	detailed classification of the index	unit
	B - Data ascertained yearly	
Dwellings	Increase of the number of dwellings by : - new construction - alteration of existing housing stock	- number of dwellings - number of habitable rooms - living area
Dwellings	Increase of the number of dwellings according to the type of houses	- number of dwellings - etc
Dwellings	Decrease of dwellings due to: - age - alteration - other reasons	" "
Dwellings	Decrease of dwellings according to the type of houses	"
Dwellings	Decrease of dwellings related to the sort of building material	"
Dwellings	Decrease of dwellings related to the age of houses	"
Dwellings	Decrease of dwellings in combination with the type of conveniences	- number of dwellings

Metodology of the census 1961

1. All persons present on the territory of Czechoslovakia at the decisive time, with except of foreign citizens enjoying diplomatic and consular preveleges, have been subjected to the census.
   Further the census related to the Czechoslovak citizens-members of Czechoslovak diplomatic and consular offices abroad - , to their families and to the Czechoslovak citizens serving at Czechoslovak navy.

2. The census has been provided by the use of the following formularies :

   i / census sheets registring :
   - a/ most part of inhabitants living in dwellings and all persons present at dwellings only temporally at the decisive time
   - b/ small part of inhabitants living or present at temporally dwelling-places or outside the dwellings

   ii/ census notes registring :
   - a/ presons present at hotels and hospitals
   - b/ members of the Czechoslovak army and police living in barracks and persons present at the houses of correction
   - c/ Czechoslovak citizens registred abroad

   The census sheet related to every dwelling. As for the administratively divided flats, the census sheet related to every part of the dwelling which the so-called "certificates" were issued for.

3. Present and resident population

   i / the base of the census formed the present population. This procedure corresponds to the principle that the population must be ascertainde at the places where it is at the dcisive time

   ii/ resident population has been ascertained jointly with the present one

This procedure led to the differentiation of futher categories of population with respect to the realtion to the place of census.

The enumeration of all resident population served for the ascertainment of the housing situation, that of all present population for demographic calculations.

3. The census sheet formed the basic printed matter registring not only the data concerning individual persons but the housing conditions and the characteristics of the houses as well.

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